

An Annotated Checklist of Bats from Iowa

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Early mention of bats in Iowa is found in publications by Allen (1869), Goding (1883), Osborn (1890, 1892), Van Hyning and Pellet (1910), Cory (1912), and Ruthven and Wood (1912). The occurrence in the state of some species listed in these early accounts evidently was not substantiated by specimens. Scott (1937) in his "Mammals of Iowa" reviewed the status of chiropterans in the state. In this paper, six species (*Myotis keenii*, *Myotis lucifugus*, *Eptesicus fuscus*, *Lasiurus borealis*, *Lasiurus cinereus*, and *Tadarida macrotis*) were authenticated by actual specimens. Scott (1939) later added *Pipistrellus subflavus* to the list of Iowa bats, and also identified as *Myotis subulatus* the one specimen assigned to *M. keenii* in 1937. This bat was incorrectly identified by Scott and is discussed in the account of *Myotis lucifugus*. In the past decade, Muir and Polder (1960) recorded *Myotis sodalis* from Iowa, Kunz (1966) reported *Nycticeius humeralis*, and Easterla and Watkins (1967) mentioned the first actual specimens of *Lasionycteris noctivagans* from the state. The first authentic record of *Myotis keenii septentrionalis* is reported in this paper. Thus, at this writing, a total of 10 species of bats is known certainly to occur in Iowa.

In the past few years there has been increased interest in the study of bats in Iowa. We began investigations independently in the state in 1965 and combined our efforts in 1966. One of us (Kunz) is continuing research on the natural history of several species. In the course of recent work, many bats have been banded and released in an attempt to learn more of movements and longevity. Additionally, workers in adjacent states have banded thousands of bats, some of which already have been recaptured in Iowa. Persons finding banded bats are requested to read the band number carefully, and, if possible, release the bat unharmed. Band numbers should be reported to the Bird and Mammal Laboratories, U. S. Fish and Wildlife Service, U. S. National Museum, Washington, D. C. 20560, along with the exact date and place of capture.

This paper represents a progress report of our studies and includes specimens obtained by us, those deposited in other institutions, records of

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banded bats, and reports from the literature. Much remains to be learned concerning the distribution and ecology of bats in Iowa, and it is hoped that this paper will stimulate additional studies.

All specimens listed as examined are deposited in the Museum of Natural History at The University of Kansas unless otherwise indicated. We are indebted to the following persons for loan of materials or for allowing us to study specimens under their care (abbreviations of institutions are those used in text): Mr. Michael W. Hager, Davenport Public Museum (DPM); Mr. Ronald E. Smith, Buena Vista College (BV); Dr. Milton W. Weller, Iowa State University (ISU); Mr. David A. Easterla, Northwest Missouri State College (NWM); and Dr. Charles O. Handley, Jr., U. S. National Museum (USNM).

We are grateful also to Dr. John E. Ubelaker, Emory University, Atlanta, Georgia, for identifying ectoparasites, and to Dr. Richard F. Myers, University of Missouri, Kansas City, for providing information on bats banded in Iowa and Missouri. Appreciation is extended to Messrs. John B. Bowles, Hugh H. Genoways, and Robert W. Patterson, Museum of Natural History, The University of Kansas, and Robert M. Wessleman, Drake University, for assistance in the field.

***Myotis keenii septentrionalis* (Trouessart, 1897)**

Keen's *Myotis*

Distribution in Iowa—Probably state-wide.

Specimens examined (12).—DES MOINES CO.: Starr's Cave, 1 mi. N Burlington, 6. KEOKUK CO.: Sigourney, 5. JACKSON CO.: Hunter's Cave, 1 (DPM).

An adult male, taken by Stewart Peck on November 21, 1957, in Hunter's Cave, Jackson County, is the first authentic record of this bat from Iowa. Recently, specimens have been taken in Des Moines County (March 1966) and in Keokuk County (Sept. 1966). The status of a specimen incorrectly reported as *M. k. septentrionalis* by Scott (1937) is discussed in the account of *M. lucifugus*.

In differentiating between *M. lucifugus* and *M. keenii* in Iowa, the length of both the ear and the tragus are diagnostic. *M. keenii* has a longer ear (at least 16 mm from the notch) and a long, pointed tragus, whereas *M. lucifugus* has a shorter ear (less than 16 mm) and a shorter, relatively blunt tragus; it is possible that some of the bats earlier reported from Iowa as *lucifugus* actually represent *keenii*. One specimen examined (KU 107924) possesses a peculiar abnormality in that both tragi are markedly truncated, although not to the extent as in the *Myotis keenii apache* figured by Koopman (1963).

Myotis lucifugus lucifugus (Le Conte, 1831)

Little Brown Myotis

Distribution in Iowa.—State-wide.

Specimens examined (82).—ALLAMAKEE CO.: 6 mi. S, 3 mi. E Waterville, 10. BUENA VISTA CO.: Storm Lake, 1 (BV). CLAYTON CO.: McGregor, 5 (USNM); Guttenburg, 6. DELAWARE CO.: Backbone State Park, 2 (ISU). DES MOINES CO.: Starr's Cave, 1 mi. N Burlington, 1. DUBUQUE CO.: Dubuque, 1 (USNM); Dubuque Township, sec. 24, 2 (ISU). HANCOCK CO.: Pilot Knob State Park, 3 (2 ISU). JACKSON CO.: Ciro's Cave, 1 (DPM). JOHNSON CO.: Lone Tree, 25 (USNM). KEOKUK CO.: Sigourney, 1. KOSSUTH CO.: Algona, 1 (ISU). LINN CO.: 6 mi. SW Cedar Rapids, 1 (NWM). MAHASKA CO.: North Skunk River, ½ mi. S, 5 mi. E New Sharon, 10; Oskaloosa, 1; 3½ mi. N, ½ mi. E Freemont, 10. POLK CO.: Birdland Park, Des Moines, 1.

Additional records.—CLAYTON CO.: McGregor (Sherman, 1929). National (Sherman, 1929). DELAWARE CO.: Manchester (R. F. Myers, pers. comm.). DES MOINES CO.: no specific locality (Shramm, 1957). DICKENSON CO.: Lakeside Laboratory (Stephens, 1922); Milford (Keegan, 1943). DUBUQUE CO.: Becker's Quarry Cave and Crystal Lake Cave (Muir and Polder, 1960). HUMBOLDT CO.: no specific locality (Blankespoor, 1967). MUSCATINE CO.: Fairport (Scott, 1937). PLYMOUTH CO.: no specific locality (Blankespoor, 1967). POWESHIEK CO.: Grinnell (Miller and Allen, 1928). STORY CO.: no specific locality (Blankespoor, 1967). UNION CO.: 5 mi. E Aston (Easterla and Watkins, 1967). WAPELLO CO.: between Eldon and Ottumwa (R. F. Myers, pers. comm.). WINNEBAGO CO.: no specific locality (Blankespoor, 1967). WINNESHIEK CO.: Canoe Creek (Hoslett, 1965).

Myotis lucifugus is one of the commonest of Iowa bats. It is a frequent inhabitant of buildings and outdoor shelters from spring through early autumn but retreats to hibernacula, mostly caves, for the winter. Muir and Polder (1960) noted that movement into caves did not occur until after November 9. Pregnant females have been taken as early as May 9 and as late as June 26; only a single embryo per female has been recorded.

There is evidence that some individuals of *M. lucifugus* that spend the summer in Iowa move to caves in the Ozark Plateau of Missouri in winter, returning again the following spring (R. F. Myers, personal communication). Noting seasonal movements, Sherman (1929) reported that this species arrived in spring in Clayton County between May 2 and May 30 and departed in autumn between September 19 and October 16.

Scott (1937) incorrectly referred a bat originally listed as "*Vespertilio subulatus*" by Osborn (1892) to *Myotis keenii septentrionalis* (Trouessart). This specimen was subsequently located and identified by Scott (1939) as *Myotis subulatus subulatus* (Say). The specimen, an adult female preserved in alcohol (USNM 264171), taken by A. M. Quist, on May 12, 1883, at Ames, Story County, was recently examined by us and is clearly referable to *M. lucifugus*.

Myotis sodalis Miller and Allen, 1928

Indiana Myotis

Distribution in Iowa.—Southeastern part of state.

Specimens examined.—None.

Additional records.—DUBUQUE CO.: Becker's Quarry Cave, Dubuque (Muir and Polder, 1960).

Two specimens in alcohol from Becker's Quarry Cave, Dubuque County, evidently on deposit in the private collection of Emmett Polder, are the only individuals of this species known to be preserved from Iowa. These were taken in a hibernaculum in association with *Eptesicus fuscus*, *Myotis lucifugus*, and *Pipistrellus subflavus*; *M. sodalis* was the rarest of the four species in the quarry according to Muir and Polder (1960).

More extensive collecting in the eastern part of Iowa, especially in caves, certainly will reveal additional localities of record for this bat.

Lasionycteris noctivagans (Le Conte, 1831)

Silver-haired Bat

Distribution in Iowa.—State-wide as seasonal migrant and probably also as resident in warm months.

Specimens examined (19).—BOONE CO.: Ledges State Park, 3. GREENE CO.: Franklin Township, 2 (ISU). GUTHRIE CO.: T. 80 N, R. 33 W, 1 (ISU). MAHASKA CO.: Oskaloosa, 3; 1/2 mi. S, 5 1/2 mi. E New Sharon, 4. POLK CO.: 1/2 mi. W Des Moines, 1. UNION CO.: 5 mi. E Afton, 4 (NWM). WARREN CO.: 8 mi. N Indianola, 1.

Additional records.—CLINTON CO.: no specific locality (Blankespoor, 1967).

Although this bat is known certainly from only eight Iowa counties, it likely will be found in wooded areas throughout the state. Individual specimens have been shot at dusk in deciduous woodland adjacent to ponds and rivers and have been netted over small streams. Blankespoor (1967) reported one taken from a building in Clinton County.

The earliest record from the state in spring for this species is April 15, and the latest report for autumn is October 2. Pregnant females are known from as early as May 14 and as late as June 22 (Schlitter and Bowles, 1967). Additionally, four females, at least one of which was lactating, were taken on July 1, 1966, by Easterla and Watkins (1967) in Union County. Young of the year have been taken in July and August, but no adult males have yet been reported from the state. Contrary to information available from adjacent states, females of the silver-haired bat probably remain in Iowa throughout the summer, arriving in early spring and departing in late summer or early autumn.

Pipistrellus subflavus subflavus (F. Cuvier, 1832)**Eastern Pipistrelle***Distribution in Iowa.*—Probably state-wide.

Specimens examined (19).—BOONE CO.: $\frac{1}{2}$ mi. S, $1\frac{1}{2}$ mi. W Boone, 1. BUENA VISTA CO.: Storm Lake, 1 (BV). CLAYTON CO.: Spook Cave, SE $\frac{1}{4}$ sec. 21, T. 95 N, R. 4 W, 1 (ISU). CLINTON CO.: $\frac{1}{4}$ mi. N Clinton, 2. DALLAS CO.: 1 mi. N Adel, 1. DUBUQUE CO.: Dubuque Township, sec. 24, 1 (ISU); Palmer's Creek, Dubuque, 1 (ISU); Dubuque Township, 1 (ISU). HARDIN CO.: Rattlesnake Cave, $\frac{1}{2}$ mi. N Eldora, 2. JACKSON CO.: Maquoketa Caves State Park, 4 (3 ISU); Ciro's Cave, Maquoketa, 1 (DPM). MAHASKA CO.: North Skunk River, $\frac{1}{2}$ mi. S, 5 mi. E New Sharon, 2. POLK CO.: Beaver Creek, $\frac{1}{2}$ –1 mi. N Des Moines, 1 (ISU).

Additional records.—BLACK HAWK CO.: no specific locality (Blankespoor, 1967). DUBUQUE CO.: Becker's Quarry Cave, Dubuque (Muir and Polder, 1960); Hill Street Cave, Dubuque (Muir and Polder, 1960); Dubuque (Scott, 1939). GRUNDY CO.: Fairfield Township (Polder, 1953).

This pipistrelle has been taken in caves throughout the year in the eastern part of the state. It has been found in hibernacula with *Eptesicus fuscus*, *Myotis lucifugus*, and *Myotis sodalis* (Muir and Polder, 1960). Pregnant females have been taken through the first two weeks in June, whereas lactating females are known from early in July.

Eptesicus fuscus fuscus (Palisot de Beauvois, 1796)**Big Brown Bat***Distribution in Iowa.*—State-wide.

Specimens examined (107).—BOONE CO.: Marcy Township, sec. 19., 1 (ISU); McHose Park, Boone, 1; Ledges State Park, 5. CHEROKEE CO.: Washita, 1 (BV). CLINTON CO.: Clinton, 1. DELAWARE CO.: 2 mi. N, 1 mi. W Dundee, 3. DES MOINES CO.: Starr's Cave, 1 mi. N Burlington, 3. DUBUQUE CO.: Dubuque, 7 (ISU). EMMET CO.: Estherville, 4 (ISU). GREENE CO.: Franklin Township, sec. 13, 1 (ISU). JACKSON CO.: Maquoketa Caves State Park, 11 (5 ISU). JEFFERSON CO.: Fairfield, NE $\frac{1}{4}$ sec. 31, 1 (ISU). JOHNSON CO.: Iowa City, 1. KEOKUK CO.: Sigourney, 1. LEE CO.: Fort Madison, 13. MAHASKA CO.: $1\frac{1}{2}$ mi. S, $2\frac{1}{2}$ mi. E New Sharon, 1; North Skunk River, $\frac{1}{2}$ mi. S, 5 mi. E New Sharon, 1; Oskaloosa, 14. MARION CO.: Knoxville, 1 (USNM). MARSHALL CO.: Marshalltown, 1 (ISU). POLK CO.: $\frac{1}{2}$ –1 mi. N Des Moines, 2 (ISU); Des Moines, 5. SCOTT CO.: Davenport, 2 (DPM). STORY CO.: Ames, 18 (13 ISU, 1 USNM); 2 mi. S, 1 mi. E Ames, 1. WAPELLO CO.: Ottumwa, 5. WARREN CO.: 8 mi. N Indianola, 1. WEBSTER CO.: Dolliver Memorial State Park, 1.

Additional records (Muir and Polder, 1960, unless otherwise noted).—CLAYTON CO.: National (Sherman, 1929). DUBUQUE CO.: Simpson Furnace Mine, 2 mi. W Dubuque; Becker's Quarry Cave, Dubuque; Hill Street Cave, Dubuque; Dubuque (Scott, 1937); Bronze Bottom Cave, 1 mi. S Center Grove; Crystal Lake Cave, 4 mi. S Dubuque. JOHNSON CO.: Iowa City (Scott, 1957). MUSCATINE CO.: no specific locality (Blankespoor, 1967). STORY CO.: Ames (Macy and Rausch, 1946). WINNESHIEK CO.: Decorah (Hoslett, 1965).

The big brown bat is without doubt the most abundant and widely distributed bat in Iowa. It has been taken from autumn through early spring in caves and buildings that serve as hibernacula. Muir and Polder (1960) noted, for instance, that *E. fuscus* was the commonest bat of the four species that occur in caves in Dubuque County in mid-winter. Males frequently inhabit roosts the year around although females leave hibernacula to form maternity colonies. In central Iowa, maternity colonies have been located in attics of buildings that provide relatively high ambient temperatures. Parturition has been observed as early as June 13; two young usually are born. Some young of the year are capable of flight at least by July 22.

Three bats examined for ectoparasites from Polk County harbored numerous ticks, *Ornithodoros kelleyi* Cooley and Kohls, and mites, *Spinturnix bakeri* Rudnick, the latter constituting the first record from Iowa.

***Lasiurus borealis borealis* (Müller, 1776)**

Red Bat

Distribution in Iowa.—Migrant; state-wide in warm months.

Specimens examined (40).—BOONE CO.: 2 mi. W, 1½ mi. S Boone, 1; 3½ mi. S Boone, 1; Ledges State Park, 2. BUENA VISTA CO.: Storm Lake, 1 (BV). CARROLL CO.: Carroll, 4 (ISU). DES MOINES CO.: Burlington, 5 (USNM). EMMET CO.: 6 mi. E, 3½ mi. N Estherville, 1 (ISU); 3 mi. S, 3 mi. E Wallingford, 1 (ISU). JASPER CO.: ½ mi. N, ½ mi. W Colfax, 1. LYON CO.: Lyon Township, sec. 12, 1 (ISU); Elgin Township, sec. 26, 1 (ISU); Elgin Township, sec. 35, 1 (ISU). MAHASKA CO.: Oskaloosa, 3. MONONA CO.: Franklin Township, sec. 6, 1 (ISU). POLK CO.: Des Moines, 1; Brown Woods, ½ mi. W Des Moines, 3. SCOTT CO.: Davenport, 1 (DPM). STORY CO.: Ames, 7 (ISU); 2 mi. S, 1 mi. E Ames, 1. VAN BUREN CO.: Stockport, 1 (ISU). WEBSTER CO.: Dolliver Memorial State Park, 1. WINNESHIEK CO.: Decorah, 1 (ISU).

Additional records.—CASS CO.: Lewis (McClure, 1939). DICKINSON CO.: no specific locality (Blankespoor, 1967). MARSHALL CO.: no specific locality (Gabrielson, 1921). POTTAWATTAMIE CO.: no specific locality (Constantine, 1966). SAC CO.: Wall Lake (Spurrell, 1917). STORY CO.: Ames (Elwell, 1962). WINNESHIEK CO.: W Decorah (Hoslett, 1965).

The red bat is a common resident of Iowa from May through September. The earliest spring record is of a female taken on April 21, 1967, at Oskaloosa, Mahaska County, whereas the latest record in autumn is of a male taken on October 6, 1961, at a place 3 mi. S and 3 mi. E Wallingford, Emmet County.

One to four young are born in June; July 15 is the earliest date on which a flying young has been taken. Additionally, McClure (1942) observed young of the year in flight by mid-July and reported a peak of activity on July 24.

Lasiurus borealis roosts in trees by day and is one of the earliest bats to fly at dusk. Roosts frequently are in American elm and box elder trees at the edges of forests and along fence rows, as well as in urban areas. Solitary bats usually roost at lower levels in trees, whereas clusters of adult females and young, or solitary young, select higher roosts (Constantine, 1966).

***Lasiurus cinereus cinereus* (Palisot de Beauvois, 1796)**

Hoary Bat

Distribution in Iowa.—Migrant; state-wide in suitable habitat in warm months.

Specimens examined (16).—BOONE CO.: Ledges State Park, 4. CASS CO.: Lewis, 1 (ISU). CLAY CO.: no specific locality, 1 (USNM). GREENE CO.: Franklin Township, 1 (ISU). LINN CO.: Marion, 1 (ISU). LYON CO.: Lyon Township, 1 (ISU). MAHASKA CO.: Oskaloosa, 1. MONONA CO.: Franklin Township, 1 (ISU). SCOTT CO.: Davenport, 2 (DPM). STORY CO.: Ames, 3 (ISU).

Additional records.—CASS CO.: Lewis (McClure, 1942). DICKINSON CO.: Lakeside Laboratory (Stephens, 1922). FLOYD CO.: no specific locality (Brown, 1917—see Schlitter & Bowles, 1967). PALO ALTO CO.: no specific locality (Ruthven and Wood, 1912). POLK CO.: no specific locality (Blankespoor, 1967). POTTAWATTAMIE CO.: no specific locality (Constantine, 1966). SAC CO.: no specific locality (Spurrell, 1917). STORY CO.: no specific locality (Blankespoor, 1967).

The hoary bat is known in Iowa from late May through early September and is distributed throughout the state. The earliest spring record is of a female taken on May 29, 1959, in Davenport. However, McClure (1942) reportedly observed hoary bats in southwestern Iowa as early as May 13 and subsequently observed two young born "some-time two days before June 12." An adult female with two young was obtained on June 12, 1965, by Jack E. Coffey in Linn County after being knocked from a tree by a blue jay. Constantine (1966) reported nursing young as late as August 1. The latest specimens on record from the state are young of the year that were obtained on August 15, although McClure reportedly observed hoary bats in early September. No adult males have been recorded from Iowa, and Findley and Jones (1964) presented evidence suggesting that the summer range of males may be at higher altitudes and latitudes to the west and north of the state.

The roosting habits of hoary bats are similar to those of red bats. The same roost may be used by the same bat on several consecutive days and at other times may be used by red bats or other hoary bats (McClure, 1942). *L. cinereus* flies relatively late, and, consequently, individuals seldom are seen until well after dusk. Hoary bats have been netted over small woodland streams in central Iowa.

Nycticeius humeralis humeralis (Rafinesque, 1818)

Evening Bat

Distribution in Iowa.—Probably migrant; resident in at least southern half of the state in warm months.

Specimens examined (32).—DALLAS CO.: 1 mi. N Adel, 2. MAHASKA CO.: Penn Woods, Oskaloosa, 4; 1/2 mi. S, 5 1/2 mi. E New Sharon, 6. MARION CO.: 1-1 1/2 mi. W Percy, 1. POLK CO.: 1/2-1 mi. N Des Moines, 1 (ISU); 1/2 mi. W Des Moines, 6. SCOTT CO.: Davenport, 3 (USNM). WARREN CO.: 8 mi. N Indianola, 9.

The evening bat is a common summer resident in southern Iowa. It is known with certainty to occur as far north as Dallas and Polk counties in central Iowa and to Scott County to the east. The earliest spring record is for May 25 from Mahaska County, whereas the latest date on which a specimen has been taken is August 6 (Warren County). It is of interest to note that no adult males have been taken in the state. Pregnant females have been obtained as early as May 25 and as late as June 4. Of 10 pregnant females taken in Mahaska County, all but two contained two embryos (Schlitter and Bowles, 1967). Lactating females have been taken as early as June 25 and flying young as early as July 18.

Most of the specimens reported herein have been shot at dusk near deciduous woodland adjacent to streams, rivers, or ponds. In the southern part of its geographic range, this bat roosts in buildings, and possibly will be found in similar situations in Iowa. Because many Iowa specimens have been taken in areas far removed from man-made structures suitable for roosts, it is likely that many evening bats seek daytime retreats in hollow trees or beneath loose bark.

Tadarida macrotis (Pallas, 1767)

Big Free-tailed Bat

Distribution in Iowa.—Known only from Marshall and Linn counties.

Specimens examined.—None.

Additional records.—LINN CO.: Cedar Rapids (Cory, 1912). MARSHALL CO.: Marshalltown (Gabrielson, 1916).

Only two specimens of the big free-tailed bat have been reported from Iowa. A specimen reported by Cory (1912) was found dead in Central Park, Cedar Rapids, in the autumn of 1910. The other individual was taken alive in Marshalltown on October 21, 1914 (Gabrielson, 1916).

This species has been reported from as far north as British Columbia; in the central United States it is known from Colorado, Kansas, and Oklahoma. The records in Iowa may represent stragglers from the more southerly areas.

Species Possibly Occurring in Iowa

The gray bat, *Myotis grisescens* Howell, 1909, may be found in southeastern Iowa. The nearest known naturally-occurring populations are on the Ozark Plateau area of central Missouri and in west-central Illinois. Since *M. grisescens* is a cave-dependent species, it is to be looked for in caves in the eastern part of the state. On November 5, 1964, 706 *M. grisescens* (46 females and 660 males) were banded at Rochport Cave, Boone Co., Missouri, and later were transported by automobile to Ledges State Park, Boone, Co., Iowa, where they were released on November 7, 1964, as part of an experiment to test their homing ability. According to R. F. Myers (personal communication), only nine of these bats have been recaptured to date, all in Missouri, but it is possible that some remained in Iowa. None was taken, however, in extensive field work in the summers of 1966 and 1967 by one of us (Kunz), near the area where the bats were released.

This small-footed bat, *Myotis leibii ciliolabrium* (Merriam, 1886), is known certainly from north-central Nebraska (Jones, 1964) and is to be looked for in the western part of the state. The Brazilian free-tailed bat, *Tadarida brasiliensis mexicana* (Saussure, 1860), has been reported from Kansas and southeastern Nebraska (Jones *et al.*, 1967) and may be found in the southwestern part of Iowa.

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